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10/549,277

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Songming Huang

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SCHLUMBERGER-DOLL RESEARCH

ATTN: INTELLECTUAL PROPERTY LAW DEPARTMENT

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EXAMINER

DANG, HUNG Q

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/549,277	<b>Applicant(s)</b> HUANG ET AL.	
	<b>Examiner</b> HUNG Q. DANG	<b>Art Unit</b> 2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,5-21,24-28 and 34-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-21,24-28 and 34-43 is/are rejected.
- 7) ☒ Claim(s) 43 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This communication is in response to the claims' amendments dated 11/2/2009. The amendments of claims 1, 5, 14, 21, 24, 28, 38, 40, 42; the cancellation of claims 2-4, 22-23, 29-33; and the addition of claim 43 have been entered.

#### ***Claim Objections***

2. Claim 43 is objected to because of the following informalities: on the 3<sup>rd</sup> line of claim 43, the phrase "acoustic channel" occurs twice. One occurrence should be cancelled. Appropriate correction is required.

#### ***Response to Arguments***

3. Applicant's arguments filed on 11/2/2009 have been fully considered but they are not persuasive.

#### **Issues raised by the Applicant:**

a) The Applicant's arguments assert that Dubinsky does not teach the claimed limitations as recited in the independent claims 1, 21 and 28, which require that:

- 1) there is reflection in a first state of the apparatus.
- 2) there is also a reflection in a second state.
- 3) reflection in the second state differs in phase from reflection in the first state; this difference in phase is detected at the surface.

#### **The Examiner's position:**

Art Unit: 2612

a) The Examiner disagrees. The Examiner asserts that Dubinsky does teach the above limitations. Column 5 lines 8-12 of Dubinsky suggests that the reflected signal might be phase shifted. Figure 4B shows that the flapper 426 can be set in various positions to achieve desired reflected phase shifted signal. When the flapper is set in a slanted position, the signal reflection is considered as a "first state". When the flapper 426 is in vertical position, the downward transmitted signal will go straight through; and when the signal reaches the bottom and reflects, the reflected signal will be phase shifted, which is considered as a "second state" and it indeed differs in phase from the reflection in the first state.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5-8, 10, 11, 12, 14, 15, 17, 20, 21, 24, 25, 28, 38, 40 and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Dubinsky U.S.

Patent 6,757,218.

**Note:** according to page 8 lines 12-16 and page 10 lines 15-26 of the specification, the claimed modulator in claim 1 is a stop valve that opens or blocks the access to the liquid volume (132)....; and together with the Helmholtz resonator...the reflected wave becomes a BPSK (binary phase shift key) modulated wave, transmitting data to the surface.

**Regarding claims 1, 16 and 38,** Dubinsky teaches an acoustic telemetry apparatus for communicating digital data from a down-hole location through a borehole to the surface comprising (see figure 2):

an acoustic channel (figure 2, channel 204) terminated at a down-hole end by a reflecting terminal (figure 2, unit 208);

an acoustic wave generator located at the surface and providing an acoustic wave carrier signal within said acoustic channel (column 4, lines 36-45);

a modulator and a reflecting terminal located at said down-hole location, wherein the modulator and the reflecting terminal form a phase shifting reflector configured to modulate phase of the carrier wave in response to a digital signal; the modulator and the reflecting terminal being switchable between a first reflecting state which reflects the carrier wave and a second reflecting state which also reflects the carrier wave with said second reflecting state giving a a shift in phase relative to reflection by said first state (paragraph bridging columns 4-5; and column 5 line 63 to column 6 line 10; and column 5 lines 8-12. Also see the Examiner's position in the above "Response to Argument" section); and

one or more sensors (figure 2, unit 214) located at the surface adapted to detect related modulated information of acoustic waves traveling within said acoustic channel.

Notice that from column 5 line 63 to column 6 line 10, Dubinsky teaches that the resonator having a **two-position** flap (426). The flap 426 is mounted to the body 422 on a controllable pivot 428 that allows the flap 426 to be controlled to at least two positions 426a and 426b.....One position 426a of the flap 426 results in a little or not reflection of a source signal. A second position 426b of the flap 426 results in a substantial reflection of the source signal. **Thus a binary string message is easily created** that is passively **transmitted to the surface as an echo signal by control of the flapper 426.**

As mentioned in the above NOTE, **the claimed modulator, as supported by the specification, is an open/close valve which operates in the same manner as the flapper taught by Dubinsky to ultimately generate binary data.**

**Regarding claim 5**, according pages 8-10 of the specification...the modulator comprises a Helmholtz resonator...and when the Helmholtz resonator is enabled...the acoustic impedance at the down-hole end of the annulus equals that of the resonator, and the reflected wave is phase-inverted; when disabled, the reflected wave has no phase change.

Dubinsky also teaches the same concept (paragraph bridging columns 4-5) of switching between a first state that causes the phase of an acoustic wave reflected at said terminal to invert and a second state that maintains the original phase of the incident wave by operating the modulator (valve) and the Helmholtz resonator as described on pages 8-10 of the specification of this application.

**Regarding claim 6**, the acoustic channel disclosed by Dubinsky is also a column of liquid extending from the surface to a down-hole location (column 4, lines 36-48).

**Regarding claim 7**, the acoustic channel disclosed by Dubinsky is also formed by filling an annular volume in the borehole with a liquid (figure 2 and column 4, lines 36-48).

**Regarding claim 8**, Dubinsky also teaches that the acoustic channel is formed by filling a tubing string suspended in the borehole with a liquid (column 4, lines 36-46).

**Regarding claims 10 and 24**, the modulator disclosed by Dubinsky is also a Helmholtz resonator located in the vicinity of the reflecting terminal point (paragraph bridging columns 4-5). Also see the rejection of claim 1.

**Regarding claim 11**, the resonator disclosed by Dubinsky also comprises a liquid filled volume enclosed in a housing having a tubular opening to the reflecting terminal (column 5 lines 39-55; the tubular openings in this case are the controlled pistons).

**Regarding claim 12**, the resonator disclosed by Dubinsky also has two or more tubular openings to the reflecting terminal (column 5 lines 39-55; the tubular openings in this cases are the controlled pistons).

**Regarding claim 14**, Dubinsky also teaches an acoustic receiver (figure 2, unit 210) in a downhole location adapted to receive acoustic wave signal in a down-hole location.

**Regarding claim 15**, the digital data disclosed in Dubinsky's system is also encoded digital data (see figure 2).

**Regarding claim 17**, the sensors disclosed by Dubinsky are also connected to a signal processing unit adapted to filter the carrier wave signal from detected information (column 4, lines 44-46).

**Regarding claim 20**, Dubinsky also teaches the use of the apparatus of claim 1 in a well stimulation operation. The well stimulation operation in this case is the operation of the downhole Helmholtz resonator being resonated by the received acoustic signal.

**Regarding claims 21, 28, 40 and 42**, see the rejection of claim 1.

**Regarding claim 25**, Dubinsky also teaches the steps of performing measurements of downhole parameters; encoding said measurements into a bitstream; and controlling the reflecting properties of the reflecting terminal in response to said encoded bitstream (column 7, lines 34-50).



Art Unit: 2612

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 9, 13, 26, 27, 36, 37, 39 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218.

**Regarding claim 9**, even though Dubinsky does not specifically that the column of liquid has a viscosity of less than  $3 \times 10^{-3}$  NS/m<sup>2</sup>, however, it would have been obvious to one of skilled practitioner to derive such viscosity through routine experimentations to achieve an optimal liquid channel for said acoustic data transmission.

**Regarding claim 13**, even though Dubinsky does not specifically teach that the acoustic wave generator is adapted to simultaneously generate acoustic waves at different frequencies, however, one of ordinary skill in the art at the time the invention was made would recognize that if a downhole data receiver is desired, then a different acoustic signal, which has a different frequency from the frequency of the acoustic signal that is used to resonate the downhole resonator, can be used to transmit control data to the downhole receiver just like in any other conventional downhole telemetry systems.

**Regarding claims 26 and 37**, even though Dubinsky does not specifically mention the step of selecting the frequency of the carrier wave such that it is close to the resonance frequency of the resonator used to modulate said carrier

Art Unit: 2612

wave, however, one of ordinary skill in the art would recognize that Helmholtz resonator optimally operates at its resonant frequency. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the step of selecting the frequency of the carrier wave such that it is close to the resonant frequency of the resonator so that the resonator can be resonated (enabled) to modulate the carrier wave.

**Regarding claims 36, 39 and 41**, even though Dubinsky does not specifically disclose that the acoustic wave carrier signal is continuous, however, one of ordinary skill in the art would recognize that if data is desired to be continuously transmitted and received, then clearly, the acoustic wave carrier signal would have to be continuous.

**Regarding claim 27**, Dubinsky teaches the method of claim 21. However, Dubinsky does not teach the steps of scanning through a range of possible carrier frequencies; monitoring at the surface reflected and modulated wave signal; selecting the frequency of the carrier wave such that the detection of said reflected and modulated wave signal is optimized; and commencing the communication of down-hole measurements.

The claimed steps are merely the conventional method of selecting an optimal frequency through a range of possible frequencies to achieve optimal data transmission with minimal noise and interference. The Examiner gives Official Notice that such frequency selecting method has been commonly known and applied in many acoustic communication systems in order to optimize data transmission with minimal noise and interference.

Art Unit: 2612

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide such frequency scanning steps to the method disclosed by Dubinsky so that optimal acoustic transmission can be achieved.

8. Claims 18-19, 34-35 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218 in view of KARL et al. WO 03/067029.

**Regarding claims 18-19 and 34,** Dubinsky does not specifically mention that the downhole power generator is adapted to convert acoustic energy from an acoustic wave signal generated at the surface.

KARL et al., in the same field of endeavor, discloses the conventionality of using down-hole power generator that is adapted to convert acoustic energy from an acoustic wave signal generated at the surface (see page 3, lines 12-13; and page 8, lines 34-37).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the conversion of the received acoustic wave signal into electrical signals for use as the downhole power generator disclosed by Dubinsky as suggested by KARL et al.

**Regarding claim 35,** the Examiner gives Official Notice that capacitors have been commonly known and used for storing electrical energy. Therefore, it would have been obvious to provide an energy storing capacitor to the downhole

Art Unit: 2612

power generator of the system disclosed by Dubinsky to store electrical energy to provide energy/power to one or more downhole devices.

**Regarding claim 43**, claim 43 is rejected for the same reasons stated in the rejections of claims 1, 6, 7 and 19.

### **Conclusion**

**9. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

**10.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. DANG whose telephone number is (571)272-3069. The examiner can normally be reached on 9:30AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Zimmerman can be reached on (571) 272-3059.

Art Unit: 2612

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hung Q Dang/

Examiner, Art Unit 2612

/Albert K Wong/

Primary Examiner, Art Unit 2612